

Total Maximum Daily Load Report for the Kankakee/Iroquois Watershed

FINAL

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Management

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EXECUTIVE SUMMARY

The Kankakee/Iroquois River watershed is located on both sides of the Indiana and Illinois border and drains a total of 5,153 square miles. The watershed drains almost 3,000 square miles in northwest Indiana, 2,170 square miles in northeast Illinois, and about 7 square miles in southwest Lower Michigan. The Kankakee River originates near South Bend, Indiana, and then flows westward into Illinois, where it joins with the Des Plaines River to form the Illinois River. The Iroquois River originates in the southern portion of the watershed in Indiana, and is a major tributary to the Kankakee River. It empties into the Kankakee near Kankakee, Illinois. Land use throughout the watershed is predominantly cultivated crops.

The Clean Water Act and U.S. Environmental Protection Agency (EPA) regulations require that states develop Total Maximum Daily Loads (TMDLs) for waters on the Section 303(d) lists. A TMDL is defined as “the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources and natural background” such that the capacity of the waterbody to assimilate pollutant loadings is not exceeded. A TMDL is also required to be developed with seasonal variations and must include a margin of safety that addresses the uncertainty in the analysis.

Both historical and sampling data from the summer of 2008 by Illinois and Indiana were used for the TMDL analysis. The data indicate that most sites that were sampled experienced at least one violation of water quality standards with the reductions needed to achieve water quality standards range from zero to 99 percent.

Potential sources of *E. coli* and fecal coliform in the watershed include regulated point sources such as wastewater treatment plants, concentrated animal feeding operations, storm water runoff from Municipal Separate Storm Sewer Systems (MS4s); and illicitly connected “straight pipe” discharges of household waste. Point sources are regulated through the National Pollutant Discharge Elimination System (NPDES). Potential sources also include unregulated nonpoint sources such as runoff from agricultural fields, forests, and undeveloped areas; leaking or faulty septic systems; runoff from lawn fertilizer applications; pet waste; and storm water runoff from outside of MS4 communities.

Determining the specific reasons for high bacteria counts in any given waterbody is challenging because there are so many potential sources and because bacteria counts have a high degree of variability. Within the Kankakee/Iroquois watershed, subwatersheds with relatively high animal unit densities also have the highest average *E. coli* counts. It is therefore possible that waste generated by livestock in these subwatersheds is contributing to the elevated bacteria counts. However, other factors could also explain this correlation, such as the fact these subwatersheds also tend to experience smaller flows and thus have less dilution. Specific sources of bacteria to each impaired waterbody should be further evaluated during follow-up implementation activities.

An important step in the TMDL process is the allocation of the allowable loads to individual point sources as well as unregulated sources. The Kankakee/Iroquois watershed TMDL includes these allocations, which are presented for each of the HUC 10 subwatersheds.

Nonpoint sources are considered to be the primary sources of the impairments in the Kankakee/Iroquois watershed. Although several NPDES facilities have been found to be in violation of their permit limits for bacteria, the majority of facilities discharge effluent that meets water quality standards. Nonpoint source pollution can be reduced by the implementation of Best Management Practices (BMPs). BMPs are practices used in agriculture, forestry, urban areas, and industry to reduce the potential for damage to natural resources from human activities. A BMP may be structural, that is, something that is built or involves changes in landforms or equipment, or it may be managerial, that is, changing a specific way of using or handling infrastructure or resources. BMPs should be selected based on the goals of a watershed

management plan. Landowners and urban planners can implement BMPs outside of a watershed management plan, but the overall success of BMPs is typically enhanced if it is coordinated through a planning process. Potential implementation plans are outlined in Section 9.0 of the report.

1.0 INTRODUCTION

The Kankakee/Iroquois River watershed is located on both sides of the Indiana and Illinois border and drains a total of 5,153 square miles. The watershed drains almost 3,000 square miles in northwest Indiana, 2,170 square miles in northeast Illinois, and about 7 square miles in southwest Lower Michigan. The Kankakee River originates near South Bend, Indiana, and then flows westward into Illinois, where it joins with the Des Plaines River to form the Illinois River (Figure 1). The Iroquois River originates in the southern portion of the watershed in Indiana, and is a major tributary to the Kankakee River. It empties into the Kankakee near Kankakee, Illinois. Land use throughout the watershed is predominantly cultivated crops.

The Kankakee River, the Iroquois River, and a number of tributaries are listed as impaired for *Escherichia coli* (*E. coli*) in Indiana. The Kankakee and Iroquois Rivers, as well as Sugar Creek, are listed as impaired for fecal coliform bacteria in Illinois (Table 1). A total of thirty-four waterbody segments within the watershed are cited as impaired for fecal coliform and *Escherichia coli* (*E. coli*) on the Illinois and Indiana 2006 303 (d) lists. In Indiana and Illinois, these impaired segments account for approximately 327 and 186 miles, respectively.

Because of the size of the Kankakee/Iroquois watershed, it has been divided into six major subwatershed groups. This helps facilitate a better understanding of characteristics, which uniquely affect water quality within each area. The use of subwatershed groups also enables a closer examination of key factors that affect water quality. The subwatershed groups, shown in Figure 1, include:

- Upper Kankakee
- Lower Kankakee
- Middle Kankakee
- Yellow River
- Upper Iroquois
- Lower Iroquois

The Clean Water Act and U.S. Environmental Protection Agency (EPA) regulations require that states develop Total Maximum Daily Loads (TMDLs) for waters on the Section 303(d) lists. A TMDL is defined as “the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources and natural background” such that the capacity of the waterbody to assimilate pollutant loadings is not exceeded. A TMDL is also required to be developed with seasonal variations and must include a margin of safety that addresses the uncertainty in the analysis.

The overall goals and objectives of the TMDL study for the Kankakee/Iroquois watershed were to:

- Assess the water quality of the impaired waterbodies and identify key issues associated with the impairments and potential pollutant sources.
- Use the best available science and available data to determine the maximum load the waterbodies can receive and fully support all of their designated uses.
- Determine current loads of pollutants to the impaired waterbodies.
- If current loads exceed the maximum allowable loads, determine the load reduction that is needed.
- Inform and involve the public throughout the project to ensure that key concerns are addressed and the best available information is used.

- Submit a final TMDL report to the U.S. Environmental Protection Agency (USEPA) for review and approval.

This report describes the entire analysis and, once finalized, will be submitted to EPA for approval as required by the Clean Water Act.

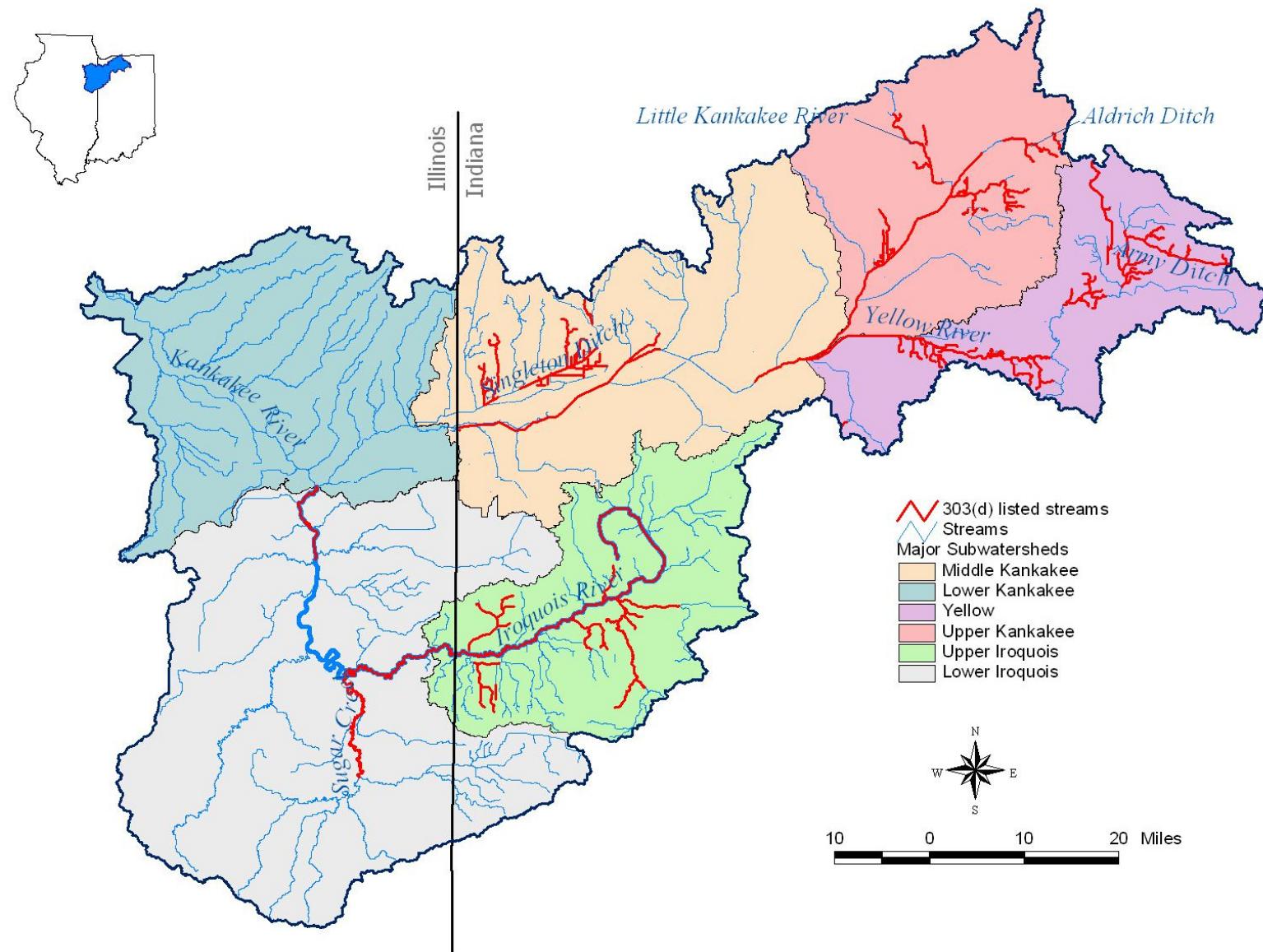


Figure 1. Location of Kankakee/Iroquois Watershed and streams listed on the 2006 Section 303(d) lists.

Table 1. 2006 303(d) List Information for the Kankakee/Iroquois Watershed.

State	Major Subwatershed	HUC	Waterbody	Segment ID	Parameter	
Indiana	Upper Kankakee	101	Pine Creek-Horace Miller Ditch	INK0126_00	<i>E. coli</i>	
			Potato Creek-Kartoffel Creek	INK0125_00	<i>E. coli</i>	
		102	Kankakee River-Mainstem	INK011A_T1001	<i>E. coli</i>	
			Little Kankakee River Byron	INK011C_00	<i>E. coli</i>	
			Kankakee River	INK011D_T1002	<i>E. coli</i>	
			Aldrich Ditch-Schang Ditch	INK0112_00	<i>E. coli</i>	
		104	Kankakee River-Mainstem	INK0131_T1003	<i>E. coli</i>	
			Kankakee River Mainstem	INK0133_T1004	<i>E. coli</i>	
			Kankakee River Mainstem	INK0134_T1005	<i>E. coli</i>	
			Kankakee River-Long Ditch	INK0138_00	<i>E. coli</i>	
			Kankakee River -Mainstem	INK0138_T1006	<i>E. coli</i>	
		107	Kankakee River Mainstem	INK013C_T1007	<i>E. coli</i>	
			Kankakee River	INK0147_T1009	<i>E. coli</i>	
			Kankakee River	INK0146_T1008	<i>E. coli</i>	
	Middle Kankakee	108	Kankakee River-English Lake	INK0183_M1011	<i>E. coli</i>	
		110	Kankakee River	INK019F_M1113	<i>E. coli</i>	
			Kankakee River	INK019F_M1104	<i>E. coli</i>	
		113	Singleton Ditch-Bryant Ditch	INK01D3_00	<i>E. coli</i>	
Illinois	Yellow	103	Armey Ditch-Headwaters	INK0154_00	<i>E. coli</i>	
			Yellow River-Army Ditch-Albert Zeiger Ditch	INK0155_00	<i>E. coli</i>	
			Stock Ditch-Bunch Branches	INK0157_00	<i>E. coli</i>	
			Yellow River-Riverside Church	INK0158_00	<i>E. coli</i>	
			Yellow River-Milner Seltzert Ditch	INK015F_00	<i>E. coli</i>	
		105	Unnamed Ditch	INK0153_T1016	<i>E. coli</i>	
			Yellow River-Listener/Clifton Ditches	INK0165_00	<i>E. coli</i>	
			Yellow River-Ober	INK0166_00	<i>E. coli</i>	
		202	Yellow River-Knox	INK016A_00	<i>E. coli</i>	
	Upper Iroquois		Slough Creek	INK0235_T1019	<i>E. coli</i>	
			Slough Creek-Carpenter Creek (Lower)	INK0238_00	<i>E. coli</i>	
			Iroquois River	INK0223_T1003	<i>E. coli</i>	
			Iroquois River	INK0226_T1004	<i>E. coli</i>	
Illinois	Lower Iroquois	214	Iroquois River	FL-02	Fecal Coliform	
		207	Sugar Creek	FLI-02	Fecal Coliform	
		210	Gofield Creek-Iroquois River	FL-04	Fecal Coliform	

2.0 DESCRIPTION OF THE WATERSHED

The Kankakee/Iroquois watershed drains 5,153 square miles. It is a part of the upper Illinois River and is comprised of thirty-two 10-digit Assessment Units (AUs) as shown in Table 2 and Figure 2. The watershed drains approximately 2,958 square miles in northwest Indiana and 2,168 square miles in northeast Illinois (a small portion (<1%) of the watershed also lies in Michigan, this portion will not be addressed in the TMDL).

The Kankakee River originates near South Bend, Indiana and flows in a general southwest direction until it turns westward at the confluence of the Iroquois River. The Kankakee River joins with the Des Plaines River to form the Illinois River. The Iroquois River is located in Indiana and Illinois and originates south of the Kankakee River watershed and meets with the Kankakee River in the Lower Kankakee subwatershed. It flows in a northeast to southwest pattern and turns westward where it meets with the Kankakee River. Major tributaries to the Kankakee River include the Iroquois River, the Little Kankakee River, and the Yellow River. The Kankakee/Iroquois watershed includes portions of 19 different counties in Indiana and Illinois (Figure 2).

Table 2. Assessment Units in Kankakee/Iroquois River Watershed

Subwatershed	HUC 10	HUC 10 Name (State)	Drainage area (sq. miles)	Percent of Total Drainage area
Upper Kankakee	101	Pine Creek (<i>IN</i>)	114.71	2.23
	102	Little Kankakee River-Kankakee River (<i>IN</i>)	233.32	4.53
	104	Mill Creek-Kankakee River (<i>IN</i>)	202.94	5.68
	107	Robbins Ditch-Kankakee River (<i>IN</i>)	118.20	3.94
Yellow	103	Headwaters Yellow River (<i>IN</i>)	292.65	2.83
	105	Yellow River (<i>IN</i>)	145.79	1.94
	106	Kline Arm (<i>IN</i>)	100.08	2.29
Middle Kankakee	108	Pitner Ditch-Kankakee River (<i>IN</i>)	193.65	3.76
	109	Hodge Ditch (<i>IN</i>)	84.14	1.63
	110	Crooked Creek-Kankakee River (<i>IN</i>)	243.35	4.72
	111	Knight Ditch-Kankakee River (<i>IN</i>)	109.11	2.12
	112	Beaver Lake Ditch-Kankakee River (<i>IL/IN</i>)	98.59	1.91
	113	Singleton Ditch (<i>IL/IN</i>)	254.29	4.93
Lower Kankakee	114	Spring Creek-Kankakee River (<i>IL/IN</i>)	186.66	3.62
	115	Rock Creek (<i>IL</i>)	121.20	2.35
	116	Horse Creek (<i>IL</i>)	128.32	2.49
	117	Forked Creek (<i>IL</i>)	135.64	2.63
	118	Kankakee River (<i>IL</i>)	263.90	5.12
Upper Iroquois	201	Oliver Ditch (<i>IN</i>)	82.35	1.60
	202	Slough Creek (<i>IN</i>)	145.10	2.82
	203	Bruner Ditch-Iroquois River (<i>IN</i>)	135.58	2.63
	204	Curtis Creek-Iroquois River (<i>IN</i>)	161.72	3.14
	205	Montgomery Ditch-Iroquois River (<i>IL/IN</i>)	160.46	3.11
Lower Iroquois	206	Mud Creek (<i>IL</i>)	286.01	5.55
	207	Sugar Creek (<i>IL/IN</i>)	277.05	5.38
	208	Spring Creek (<i>IL</i>)	253.22	4.91
	209	Prairie Creek (<i>IL</i>)	89.41	1.74
	210	Gofield Creek-Iroquois River (<i>IL</i>)	110.06	2.14
	211	Pike Creek (<i>IL</i>)	71.00	1.38
	212	Langan Creek (<i>IL</i>)	107.33	2.08
	213	Beaver Creek (<i>IL/IN</i>)	186.63	3.62
	214	Iroquois River (<i>IL</i>)	69.33	1.35

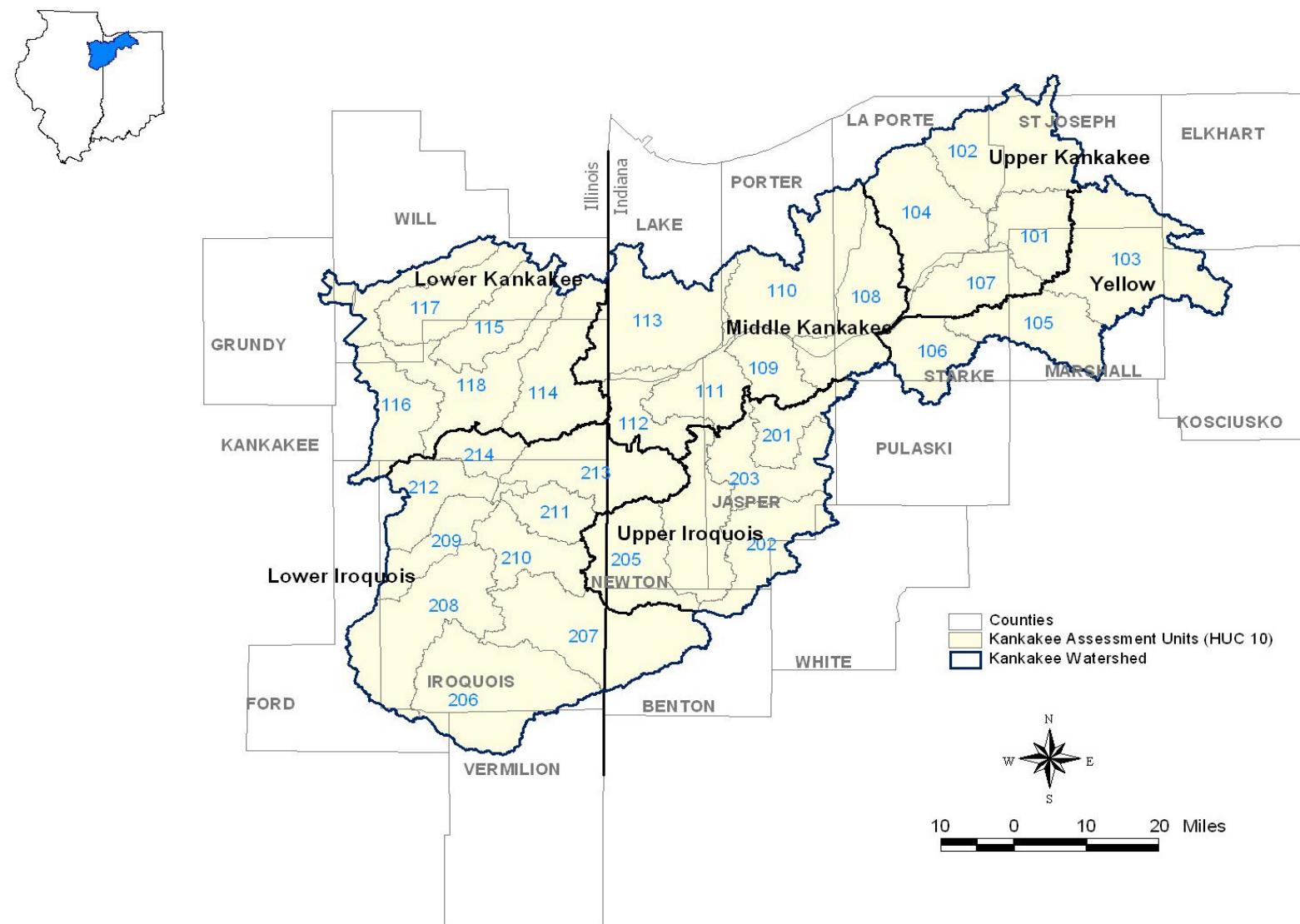


Figure 2. Assessment Units in the Kankakee/Iroquois Watershed. Numbers refer to the HUC 10 Assessment Unit Code.

2.1 Human Population

The human population of the Kankakee/Iroquois River watershed is not directly available but was estimated based on US Census data and the percentage of the total county and urban area that is within the watershed. The estimated population of the watershed is just over 1 million with approximately 77 percent of the population classified as rural residents and 23 percent classified as urban residents. Cities with a population of at least 1,000 are labeled in Figure 3.

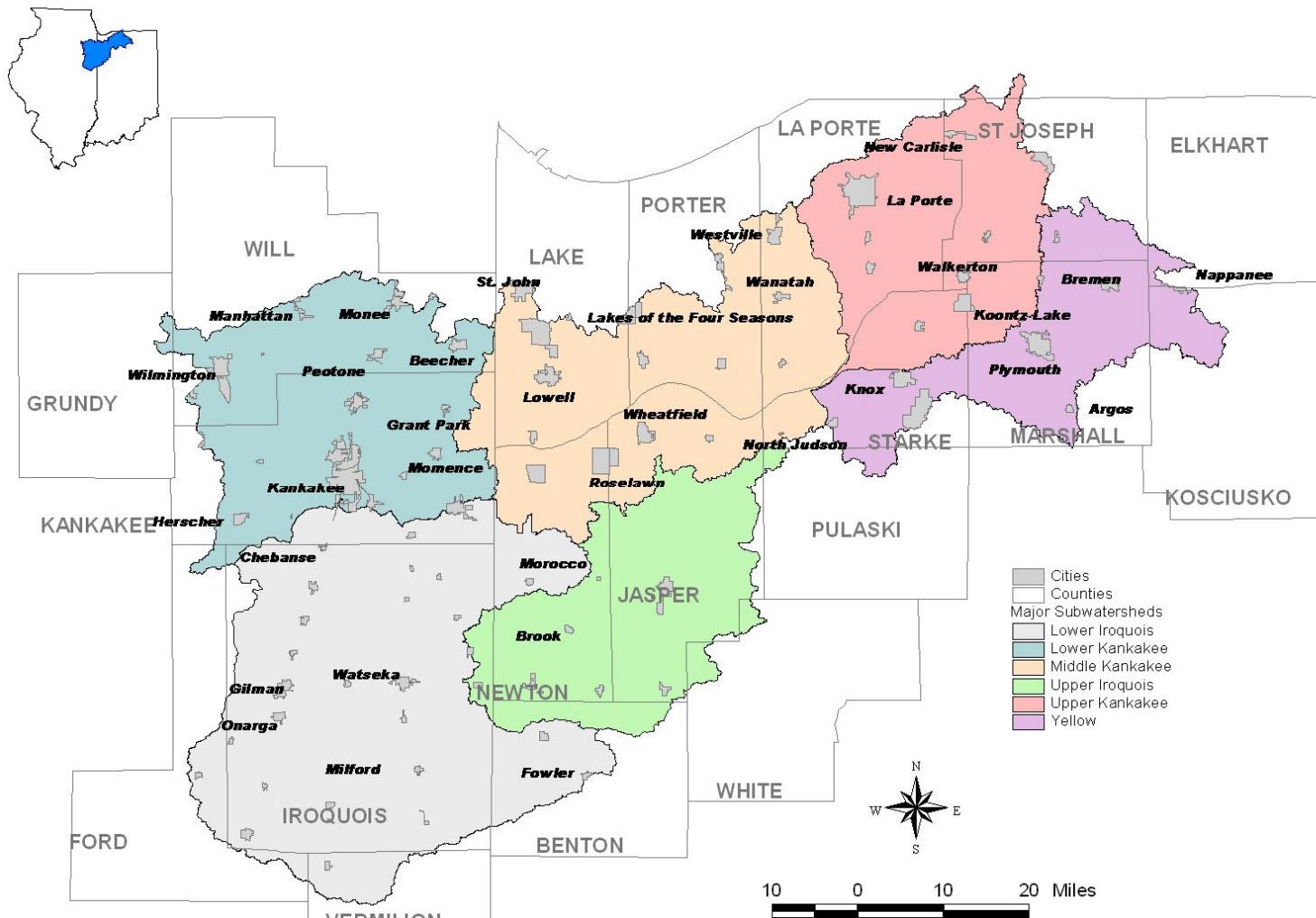


Figure 3. Cities in the Kankakee/Iroquois Watershed. Only cities with population greater than 1,000 are labeled.

2.2 Land Use/Land Cover

Land use/land cover patterns provide important clues as to the potential sources of bacteria in a watershed. Land use/land cover in the Kankakee/Iroquois River watershed is primarily agriculture, with crop production (primarily corn and soybeans) comprising 77 percent. Corn and soybean crops are not typically associated with high bacteria loads, unless they have been fertilized with manure.

Approximately eight percent of the land is forested and an additional eight percent is developed. Developed lands are characterized by impervious surfaces that increase the potential of storm water events during high flow periods delivering bacteria to downstream streams and rivers. Forested land and wetlands allow water to infiltrate slowly thus reducing the risks of bacteria contaminated water to be washed-off to waterbodies. Pasture/hay represents three percent of the watershed and indicates the presence of animal feedlots that can be significant sources of bacteria. The remaining land categories represent less than 4 percent of the total land area (Table 3 and Figure 4).

Table 3. Land Use and Land Cover of Kankakee/Iroquois Watershed

Land Use/Land Cover	Watershed		
	Area		Percent
	Acres	Square Miles	
Agricultural Lands	2,531,747	3955	76.65
Developed Land	273,270	427	8.29
Forested Land	268,995	420	8.16
Pasture/Hay	96,702	151.10	2.93
Grasslands and Shrubs	67,458	105	2.05
Wetlands	37,780	59	1.15
Open Water	22,585	35	0.69
Total	3,298,537	5153.96	100

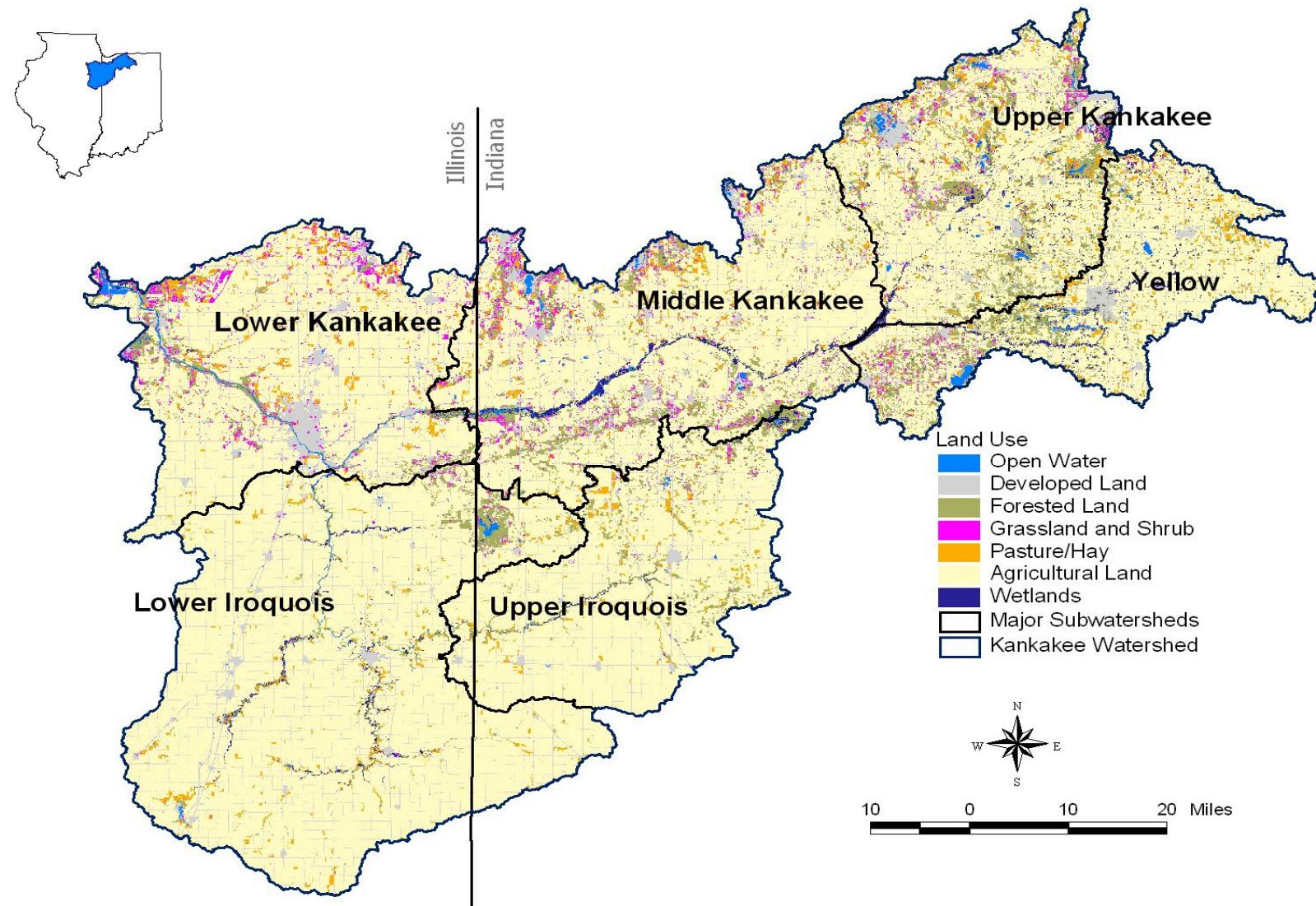


Figure 4. Land Use in the Kankakee/Iroquois River Watershed

2.3 Soils

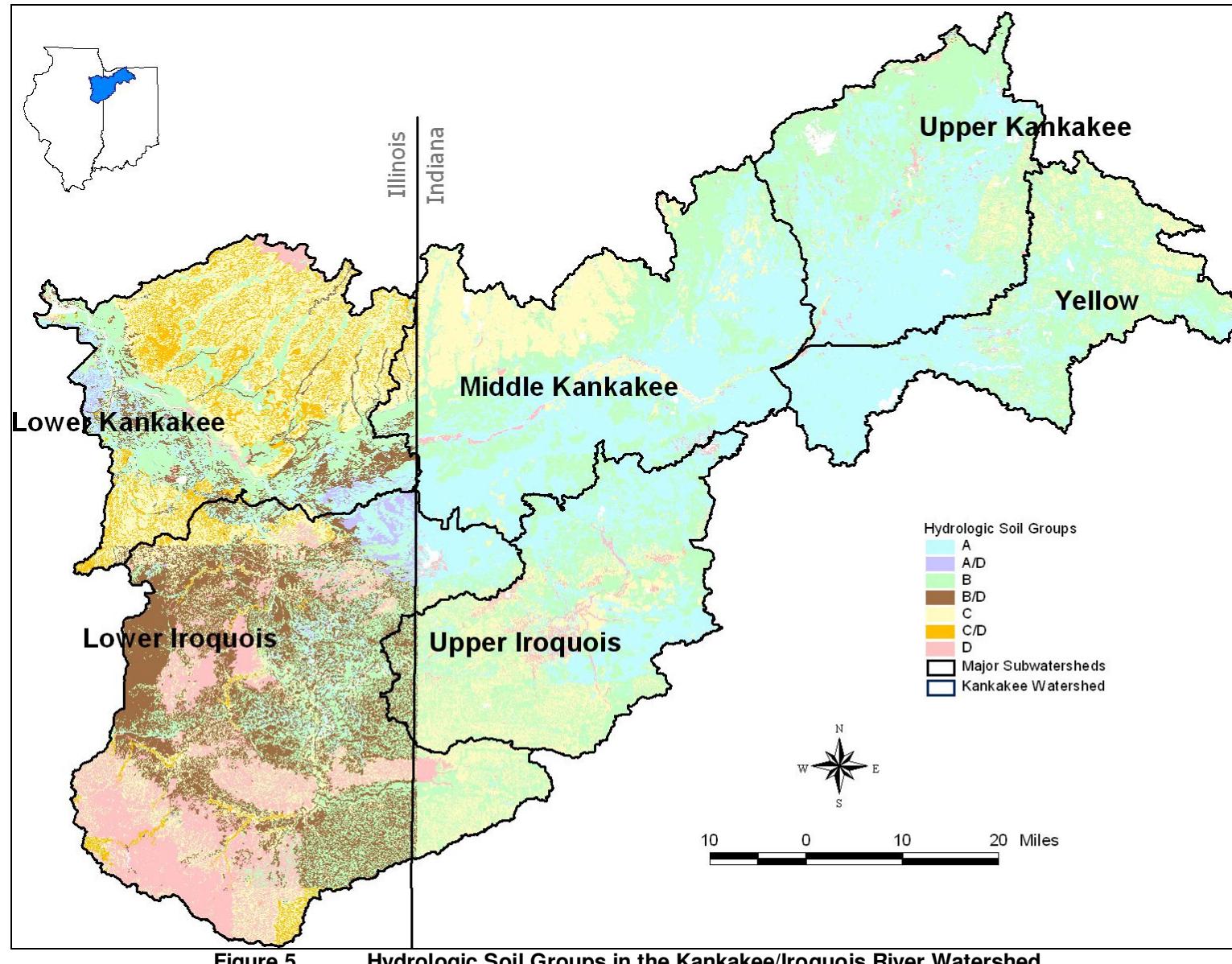
The hydrologic soil group classification is a means for categorizing soils by similar infiltration and runoff characteristics during periods of prolonged wetting. Typically, clay soils that are poorly drained have lower infiltration rates, while well-drained sandy soils have the greatest infiltration rates. The Natural Resources Conservation Service (NRCS) has defined four hydrologic groups for soils (Table 4) (NRCS, 2001) and data for the Kankakee/Iroquois watershed were obtained from the Soil Survey Geographic (SSURGO) database. Downloaded data were summarized based on the major hydrologic group in the surface layers of the map unit and are displayed in Figure 5.

The majority of the watershed is covered by B soils (29%) followed by A soils (26%), C soils (21%) and D soils (11%). Combination of A/D, B/D and C/D soils represent 0.7 percent, 9.5 percent and 3 percent of the watershed respectively. Although Figure 6 suggests that there might be distinct differences in the soil categories of Indiana and Illinois, this is actually due more to differences in the way the soils were mapped or processed in the SSURGO databases than to actual differences in soils between the two states. For example, the Indiana data rely solely on the four categories shown in Table 4 whereas the Illinois data include grouped categories such as A/D, B/D, and C/D.

Soil infiltration rates can affect bacteria loading within a watershed. During high flows, areas with low soil infiltration capacity can flood and therefore discharge high bacteria loads to nearby waterways. In contrast, soils with high infiltration rates can slow the movement of bacteria to streams and act as a filter

Table 4. Hydrologic Soil Groups

Hydrologic Soils Group	Description
A	Soils with high infiltration rates. Usually deep, well drained sands or gravels. Little runoff.
B	Soils with moderate infiltration rates. Usually moderately deep, moderately well drained soils.
C	Soils with slow infiltration rates. Soils with finer textures and slow water movement.
D	Soils with very slow infiltration rates. Soils with high clay content and poor drainage. High amounts of runoff.



2.4 Hydrology

Select US Geological Survey (USGS) gages in the Kankakee/Iroquois watershed are listed in Table 5 and shown in Figure 6. The USGS gages were used to estimate flow at ungaged locations during the development of the TMDLs (see Section 5.1.1 for additional information).

Table 5. Key USGS Sites in the Kankakee/Iroquois Watershed

Gage ID	Drainage Area	Period of Record	Active	Site Name
5515000	174	1951-2003		Kankakee River near North Liberty
5515400	3	1970-86		Kingsbury Creek near LaPorte
5515500	537	1925-2008	X	Kankakee River at Davis
5516000	135	1955-73		Yellow River at Bremen
5516500	294	1948-2008	X	Yellow River at Plymouth
5517000	435	1943-2008	X	Yellow River at Knox
5517120	44.5	1998-99		Pitner Ditch near LaCrosse
5517500	1,352	1948-2008	X	Kankakee River at Dunns Bridge
5517530	1,376	1974-2008	X	Kankakee River near Kouts
5517900	30.3	1968-2003		Cobb Ditch near Kouts
5518000	1,779	1923-2008	X	Kankakee River at Shelby
5518500	34.2	1949-51		Singleton Ditch near Hebron
5519000	123	1948-2001		Singleton Ditch at Schneider
5519500	54.7	1948-72		West Creek near Schneider
5520500	2,294	1905-2008	X	Kankakee River at Momence
5521000	35.6	1948-2003		Iroquois River at Rosebud
5521500	66.3	1948-51		Oliver Ditch near Aix
5522000	144	1949-93		Iroquois River near North Marion
5522500	203	1948-2008	X	Iroquois River at Rensselaer
5523000	21.8	1949-93		Bice Ditch near South Marion
5523500	83.7	1948-82		Slough Creek near Collegeville
5524000	44.8	1948-82		Carpenter Creek at Egypt
5524500	449	1949-2008	X	Iroquois River near Foresman
5525000	686	1944-2008	X	Iroquois River at Iroquois
5525500	446	1948-2008	X	Sugar Creek at Milford
5526000	2,091	1923-2008	X	Iroquois River near Chebanse
5526500	4,810	1914-33		Kankakee River at Custer Park
5526500	12.1	1949-75		Terry Creek near Custer Park
5527500	5,150	1914-2008	X	Kankakee River near Wilmington

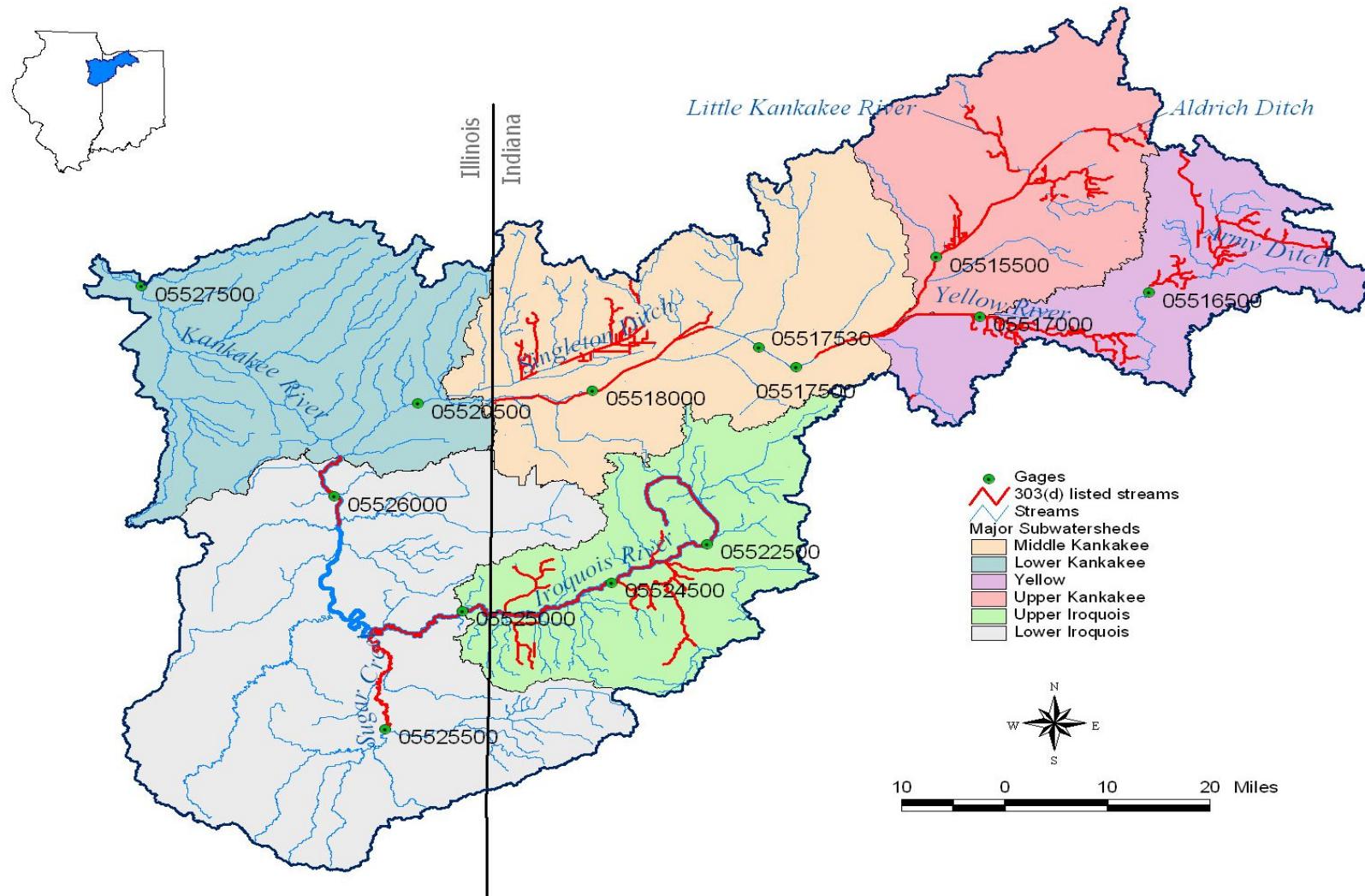


Figure 6. Active USGS Sites in the Kankakee/Iroquois Watershed

Figure 7 illustrates the monthly variation in flow patterns in the Kankakee/Iroquois watershed. Flows in general are greatest during April and May and least in August and September. These two sites also reflect the diverse, complex nature of hydrology in the basin. Both sites are comparable in drainage area but the Kankakee River at Davis is in the northern part of the watershed that is historically rich in wetlands that provide good base flows. These wetland areas also act to buffer wide variations in flow conditions that result from storm events. The Sugar Creek site, on the other hand, is in the southwestern part of the watershed. Soil conditions here do not provide the high base flows observed in the upper Kankakee. Land use in this drainage area is also dominated by row crop agriculture. Many of these fields are tile drained, one factor that contributes to the flashier flows in response to storm events that are evident in Figure 7.

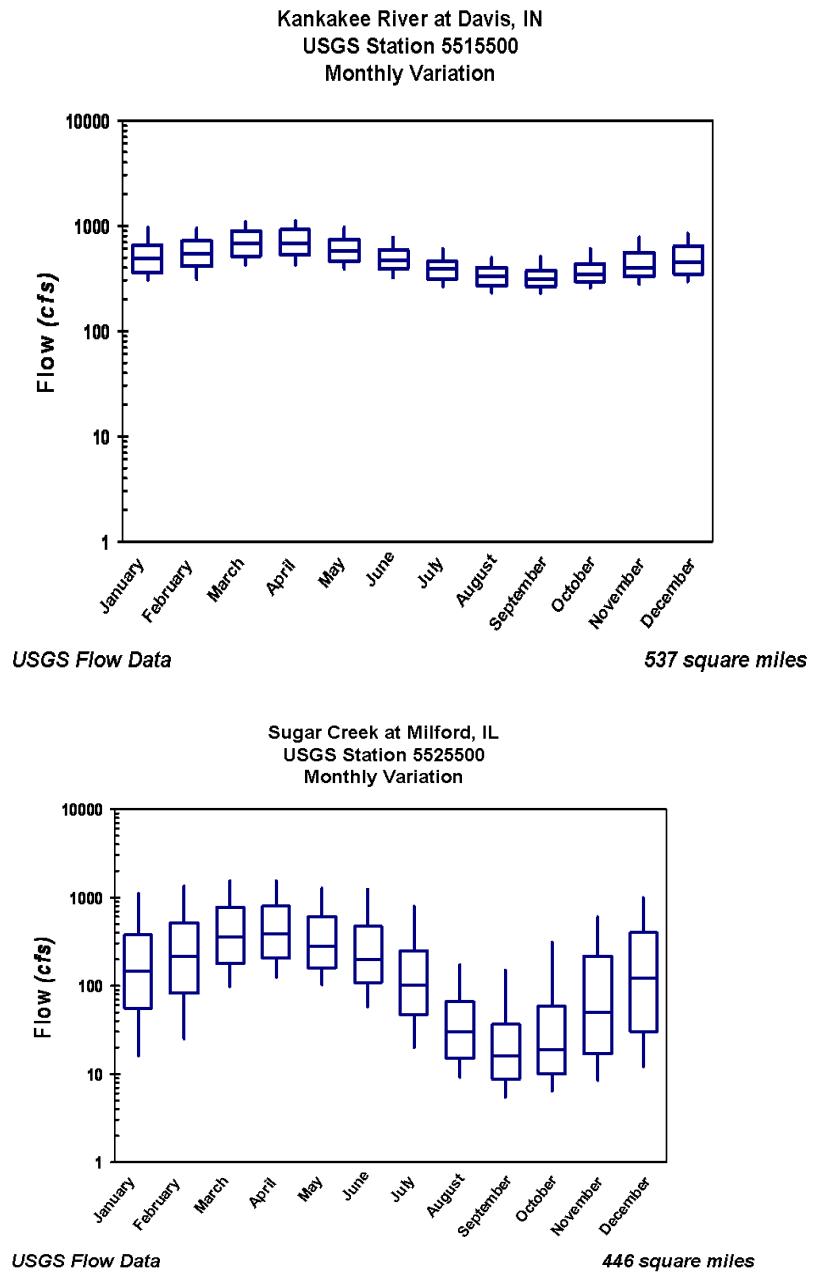


Figure 7. Monthly flow patterns for two sites in the Kankakee/Iroquois watershed.

3.0 INVENTORY AND ASSESSMENT OF WATER QUALITY INFORMATION

This section of the report provides information on the water quality standards that apply to the impaired streams in the Kankakee/Iroquois Creek watershed. A unique aspect of this TMDL is that Illinois and Indiana use different pathogen indicators to assess their water quality.

An assessment of the available bacteria data for the watershed is also presented in this section of the report.

3.1 Water Quality Standards and TMDL Target Values

Under the Clean Water Act, every state must adopt water quality standards to protect, maintain, and improve the quality of the nation's surface waters. These standards represent a level of water quality that will support the Clean Water Act's goal of "swimmable/fishable" waters. Water quality standards consist of several different components:

- **Designated uses** reflect how the water can potentially be used by humans and how well it supports a biological community. Examples of designated uses include aquatic life support, drinking water supply, and full body contact recreation. Every waterbody in Indiana and Illinois has a designated use or uses; however, not all uses apply to all waters. The Kankakee/Iroquois River TMDLs focus on protecting the designated recreational uses of the waterbodies.
- Criteria express the condition of the water that is necessary to support the designated uses. **Numeric criteria** represent the concentration of a pollutant that can be in the water and still protect the designated use of the waterbody. **Narrative criteria** are the general water quality criteria that apply to all surface waters. Numeric criteria for *E. coli* and fecal coliform were used as the basis of the Kankakee/Iroquois River TMDLs.

3.1.1 Indiana Water Quality Standards

The Kankakee and Iroquois Rivers in Indiana is listed as impaired for *E. coli*. The water quality standard pertaining to *E. coli* in Indiana is described below.

*"This subsection establishes bacteriological quality for recreational uses. In addition to subsection (a), the criteria in this subsection are to be used to evaluate waters for full body contact recreational uses, to establish wastewater treatment requirements, and to establish effluent limits during the recreational season, which is defined as the months of April through October, inclusive. *E. coli* bacteria, shall not exceed one hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period nor exceed two hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period." [Source: Indiana Administrative Code Title 327 Water Pollution Control Board. Article 2. Section 1-6(a).]*

3.1.2 Illinois Water Quality Standards

The Kankakee and Iroquois Rivers in Illinois are listed as impaired for fecal coliform. The water quality standard pertaining to fecal coliform in Illinois is described below.

Illinois' General Use Water Quality Standard for fecal coliform bacteria specifies that during the months of May through October, based on a minimum of five samples taken over not more than a 30 day period, fecal coliform bacteria counts shall not exceed a geometric mean of 200 cfu (colony forming units)/100 ml, nor shall more than 10 percent of the samples during any 30 day period exceed 400#/100 mL (35 Ill. Adm. Code 302.209 [2003]). This standard protects for Primary Contact (i.e., swimming) use of Illinois waters by humans.

3.2 Assessment of Water Quality Data

Table 6 and Table 7 summarize the bacteria data by displaying the maximum and geometric mean concentrations at all stations along with the reduction needed to meet the TMDL target values. Both historical and sampling data from the summer of 2008 by Illinois and Indiana were used for the TMDL analysis. At the Stage 1 meeting in Kankakee, the Iroquois/Ford County Department of Health suggested that additional data be collected for the tributaries to Sugar Creek. Since Illinois EPA could not support the level of sampling suggested, the Department of Health worked in conjunction with the Illinois EPA to monitor 17 additional stations in the watershed.

The percent reductions were calculated as follows:

$$\% \text{ Reduction} = \frac{(\text{Target Value} - \text{Observed Maximum})}{\text{Observed Maximum}}$$

$$\% \text{ Reduction} = \frac{(\text{Target Value} - \text{Observed Geomean})}{\text{Observed Geomean}}$$

The table indicates that most sites that were sampled experienced at least one violation of water quality standards with the reductions needed to achieve water quality standards ranging from zero to 99 percent. More site-specific information regarding existing water quality and the results of the TMDL analysis are presented in Sections 6 and 7.

Table 6. Summary of *E. coli* Data within the Kankakee/Iroquois Watershed

Major Subwatershed	Site Name	Station	Period of Record	# Samples	Geomean (#/100 mL)	Maximum (#/100 mL)	Geomean Percent Reduction (125/100mL)	Maximum Percent Reduction (235/100mL)
Lower Iroquois	Beaver Creek	48	6/2/2008 - 6/30/2008	5	330	1,986	62%	88%
	Beaver Creek	46	6/2/2008 - 6/30/2008	5	439	727	72%	68%
	Finigan Ditch	91	6/2/2008 - 6/30/2008	5	237	326	47%	28%
	Iroquois River near Chebanse	05526000	8/4/1988 - 8/9/1990	26	126	8,000	1%	97%
	Mud Creek	92	6/2/2008 - 6/30/2008	5	272	579	54%	59%
	Salisbury Ditch	44	6/2/2008 - 6/30/2008	5	156	196	20%	0%
	Sugar Creek	88	6/2/2008 - 6/30/2008	5	381	727	67%	68%
	Sugar Creek	90	6/2/2008 - 6/30/2008	5	249	687	50%	66%
Lower Kankakee	Kankakee River at Momence	05520500	8/3/1988 - 8/9/1990	22	138	8,000	10%	97%
Middle Kankakee	Beaver Lake Ditch	42	6/3/2008 - 7/1/2008	5	222	308	44%	24%
	Beaver Lake Ditch	38	6/3/2008 - 7/1/2008	5	560	866	78%	73%
	Brown Ditch	22	6/3/2008 - 7/1/2008	5	125	291	0%	19%
	Cedar Creek	26	6/3/2008 - 7/1/2008	5	485	687	74%	66%
	Cedar Creek	28	6/3/2008 - 7/1/2008	5	426	1,553	71%	85%
	Cobb Ditch	6	6/3/2008 - 7/1/2008	5	64	435	0%	46%
	Crooked Creek	27	6/2/2008 - 7/14/2008	6	689	1,986	82%	88%
	Dehaan Ditch	20	6/3/2008 - 7/1/2008	5	602	1,300	79%	82%
	Pitner Ditch	7	6/2/2008 - 6/30/2008	5	122	142	0%	0%
	Greiger Ditch	25	6/2/2008 - 7/14/2008	6	284	488	56%	52%
	Griesel Ditch	24	6/3/2008 - 7/1/2008	5	429	1,046	71%	78%
	Heinold Ditch	4	6/2/2008 - 6/30/2008	5	321	649	61%	64%
	Hodge Ditch	12	6/3/2008 - 7/1/2008	5	195	285	36%	18%
	Hunsley Ditch	31	6/4/2008 - 6/30/2008	5	1,079	2,420	88%	90%
	Kankakee River	36	6/3/2008 - 7/1/2008	5	175	249	29%	6%
	Kankakee River	5	6/2/2008 - 6/30/2008	5	338	488	63%	52%
	Kankakee River	2	6/3/2008 - 7/1/2008	5	241	411	48%	43%
	Kankakee River	16	6/3/2008 - 7/1/2008	5	239	525	48%	55%
	Kankakee River	14	6/3/2008 - 7/1/2008	5	198	285	37%	18%

Table 6. Summary of *E. coli* Data within the Kankakee/Iroquois Watershed

Major Subwatershed	Site Name	Station	Period of Record	# Samples	Geomean (#/100 mL)	Maximum (#/100 mL)	Geomean Percent Reduction (125/100mL)	Maximum Percent Reduction (235/100mL)
Middle Kankakee	Kankakee River at Dunns Bridge	KR-91	6/30/1999 - 8/25/1999	6	221	720	43%	67%
	Kankakee River at Dunns Bridge	3	6/2/2008 - 6/30/2008	5	307	461	59%	49%
	Kankakee River at Lake/Newton Co, State Line Rd - arbitrary County assignment	UMK120-0001	6/29/1999 - 7/27/1999	5	163	390	23%	40%
	Kankakee River at Shelby (SR 55)	KR-68	4/29/1988 - 8/26/1999	78	119	6,000	0%	96%
	Kankakee River at US 231, Porter and Jasper Co Line	UMK090-0011	6/30/1999 - 8/26/1999	6	258	1,300	51%	82%
	Lawler Ditch	40	6/3/2008 - 7/1/2008	5	204	411	39%	43%
	Phillips Ditch	8	6/3/2008 - 7/1/2008	5	522	866	76%	73%
	Singleton Ditch near Schneider	34	6/3/2008 - 7/1/2008	5	379	517	67%	55%
	Singleton Ditch near Schneider	SD-10	6/29/1999 - 8/23/1999	6	427	870	71%	73%
	Singleton D at SR 55	UMK130-0021	6/29/1999 - 7/27/1999	5	370	600	66%	61%
	Slocum Ditch	29	6/4/2008 - 6/30/2008	5	949	2,419	87%	90%
	Stony Run Ditch	18	6/3/2008 - 7/1/2008	5	635	770	80%	69%
	West Creek	30	6/3/2008 - 7/1/2008	5	509	1,120	75%	79%
	West Creek	32	6/3/2008 - 7/1/2008	5	561	1,733	78%	86%
	Wolf Creek	10	6/3/2008 - 7/1/2008	5	215	291	42%	19%
Upper Iroquois	Carpenter Creek	68	6/4/2008 - 7/2/2008	5	919	2,419	86%	90%
	Carpenter Creek	70	6/4/2008 - 7/2/2008	5	253	2,419	51%	90%
	Carpenter Cr @ Jasper CR 850 S	UMI030-0014	7/1/1999 - 8/25/1999	6	371	8,000	66%	97%
	Curtis Creek	62	6/4/2008 - 7/2/2008	5	649	2,419	81%	90%
	Darroch Ditch	78	6/2/2008 - 6/30/2008	5	755	1,300	83%	82%

Table 6. Summary of *E. coli* Data within the Kankakee/Iroquois Watershed

Major Subwatershed	Site Name	Station	Period of Record	# Samples	Geomean (#/100 mL)	Maximum (#/100 mL)	Geomean Percent Reduction (125/100mL)	Maximum Percent Reduction (235/100mL)
Upper Iroquois	Hunter Ditch	76	6/2/2008 - 6/30/2008	5	1,122	1,414	89%	83%
	Iroquois River	60	6/4/2008 - 7/2/2008	5	631	1,120	80%	79%
	Iroquois River	74	6/2/2008 - 6/30/2008	5	495	2,419	75%	90%
	Iroquois River	80	6/2/2008 - 6/30/2008	5	211	488	41%	52%
	Iroquois River @ US 231	UMI020-0011	6/30/1999 - 7/28/1999	5	164	730	24%	68%
	Iroquois River @ US 41	UMI050-0015	7/1/1999 - 8/24/1999	6	156	1,500	20%	84%
	Iroquois River near Kentland (I-62)	I-62	7/1/1999 - 7/29/1999	5	1,092	3,600	89%	93%
	Jungle Ditch	52	6/2/2008 - 6/30/2008	5	628	866	80%	73%
	Montgomery Ditch	86	6/2/2008 - 6/30/2008	5	581	1,046	78%	78%
	Montgomery Ditch	84	6/2/2008 - 6/30/2008	5	813	1,300	85%	82%
	Mosquito Creek	72	6/2/2008 - 6/30/2008	5	544	1,120	77%	79%
	Oliver Ditch	56	6/2/2008 - 6/30/2008	5	325	1,046	62%	78%
	Oliver Ditch	50	6/2/2008 - 6/30/2008	5	392	980	68%	76%
	Oliver Ditch	54	6/2/2008 - 6/30/2008	5	395	921	68%	74%
	Ryan Ditch	58	6/4/2008 - 7/2/2008	5	343	2,419	64%	90%
	Slough Creek	64	6/4/2008 - 7/2/2008	5	711	2,419	82%	90%
	Slough Creek	66	6/4/2008 - 7/2/2008	5	583	2,419	79%	90%
	Slough Cr @ US 231	UMI030-0013	6/28/1999 - 8/25/1999	6	489	1,600	74%	85%
	Thompson Ditch	82	6/2/2008 - 6/30/2008	5	361	866	65%	73%
Upper Kankakee	Aldrich Ditch	45	6/3/2008 - 7/1/2008	5	175	238	29%	1%
	Bailey Ditch	21	6/2/2008 - 7/14/2008	6	662	2,419	81%	90%
	Geyer Ditch	43	6/3/2008 - 7/1/2008	5	174	461	28%	49%
	Jain Ditch	61	6/4/2008 - 7/2/2008	5	205	261	39%	10%
	Kankakee River	47	6/3/2008 - 7/1/2008	5	215	345	42%	32%
	Kankakee River	33	6/2/2008 - 6/30/2008	5	347	866	64%	73%
	Kankakee River	11	6/2/2008 - 6/30/2008	5	334	579	63%	59%
	Kankakee River at SR 4	UMK010-0004	6/29/1999 - 7/27/1999	5	267	1,300	53%	82%

Table 6. Summary of *E. coli* Data within the Kankakee/Iroquois Watershed

Major Subwatershed	Site Name	Station	Period of Record	# Samples	Geomean (#/100 mL)	Maximum (#/100 mL)	Geomean Percent Reduction (125/100mL)	Maximum Percent Reduction (235/100mL)
Upper Kankakee	Kankakee River at SR 39 Bridge	UMK040-0004	7/1/1999 - 8/23/1999	6	303	780	59%	70%
	Kankakee River near Union Center	KR-118	4/27/1988 - 8/24/1999	87	271	25,000	54%	99%
	Kingsbury Creek	37	6/3/2008 - 7/1/2008	5	331	488	62%	52%
	Little Kankakee River	39	6/3/2008 - 7/1/2008	5	478	2,420	74%	90%
	Little Kankakee River	49	6/3/2008 - 7/1/2008	5	354	461	65%	49%
	Lower Kankakee River @ LaPorte CR 700 E	UMK010-0009	6/29/1999 - 8/23/1999	6	628	6,800	80%	97%
	Niespodziany Ditch	41	6/3/2008 - 7/1/2008	5	354	517	65%	55%
	Pine Creek	53	6/3/2008 - 7/1/2008	5	838	1,300	85%	82%
	Pine Creek	57	6/3/2008 - 7/1/2008	5	828	921	85%	74%
	Pine Cr at Quinn Rd	UMK020-0004	6/29/1999 - 7/27/1999	5	404	730	69%	68%
	Potato Creek	51	6/3/2008 - 7/1/2008	5	348	548	64%	57%
	Potato Cr @ Walnut Rd	UMK020-0003	6/29/1999 - 7/27/1999	5	590	1,600	79%	85%
	Robbins Ditch	59	6/4/2008 - 7/2/2008	5	243	276	49%	15%
	Robbins Ditch	23	6/2/2008 - 7/14/2008	6	284	1,414	56%	83%
	Travis Ditch @ U.S. 6	UMK030-0013	6/29/1999 - 7/27/1999	5	528	1,700	76%	86%
	Whitham Ditch	35	6/2/2008 - 6/30/2008	5	125	236	0%	0%
	Yellow Bank Creek	55	6/3/2008 - 7/1/2008	5	732	2,419	83%	90%
Yellow	Armei Ditch	85	6/3/2008 - 7/1/2008	5	1,112	1,733	89%	86%
	Bogus Run	1	6/2/2008 - 6/30/2008	5	522	1,414	76%	83%
	Bogus Run	13	6/2/2008 - 6/30/2008	5	395	727	68%	68%
	Clifton Ditch	71	6/4/2008 - 7/2/2008	5	589	1,986	79%	88%
	Craigmile Ditch	15	6/2/2008 - 6/30/2008	5	667	1,414	81%	83%
	Dausman Ditch	83	6/3/2008 - 7/1/2008	5	1,676	2,420	93%	90%
	Elmer Seltenright Ditch	77	6/3/2008 - 7/1/2008	5	1,225	2,419	90%	90%
	Harry Cool Ditch	67	6/4/2008 - 7/2/2008	5	330	649	62%	64%
	Kline Arm Ditch	17	6/2/2008 - 6/30/2008	5	499	770	75%	69%

Table 6. Summary of *E. coli* Data within the Kankakee/Iroquois Watershed

Major Subwatershed	Site Name	Station	Period of Record	# Samples	Geomean (#/100 mL)	Maximum (#/100 mL)	Geomean Percent Reduction (125/100mL)	Maximum Percent Reduction (235/100mL)
Yellow	Stock Ditch	87	6/3/2008 - 7/1/2008	5	983	2,419	87%	90%
	Unnamed Ditch	75	6/4/2008 - 7/2/2008	5	772	1,414	84%	83%
	Wolf Creek	73	6/4/2008 - 7/2/2008	5	1,085	1,414	88%	83%
	Yellow River	89	6/3/2008 - 7/1/2008	5	1,347	2,419	91%	90%
	Yellow River	79	6/3/2008 - 7/1/2008	5	853	2,419	85%	90%
	Yellow River	69	6/4/2008 - 7/2/2008	5	239	649	48%	64%
	Yellow River	9	6/2/2008 - 6/30/2008	5	427	816	71%	71%
	Yellow River	81	6/3/2008 - 7/1/2008	5	943	2,419	87%	90%
	Yellow River	19	6/2/2008 - 6/30/2008	5	591	1,046	79%	78%
	Yellow River	63	6/2/2008 - 7/14/2008	6	461	980	73%	76%
	Yellow River at E 4th Rd	UMK050-0020	7/1/1999 - 10/3/2000	8	1,321	24,200	91%	99%
	Yellow River @ S. Olive Trail	UMK060-0011	7/8/1999 - 7/28/1999	4	439	520	72%	55%
	Yellow River @ SR 23	UMK060-0012	6/28/1999 - 8/25/1999	6	171	400	27%	41%
	Yellow River @ SR 39	UMK060-0013	7/1/1999 - 8/24/1999	6	449	1,100	72%	79%
	Yellow River @ N Jarrah Rd	UMK050-0031	7/1/1999 - 8/26/1999	6	530	2,200	76%	89%
	Yellow River near Knox	65	6/2/2008 - 7/14/2008	6	445	1,300	72%	82%
	Yellow River near Knox	YR-12	7/1/1999 - 8/25/1999	6	348	1,400	64%	83%

Table 7. Summary of Fecal Coliform Data within the Kankakee/Iroquois Watershed

Watershed Group	Site Name	Station	Period of Record	# Samples	Geomean (#/ 100 mL)	Maximum (#/ 100 mL)	Geomean Percent Reduction (200/ 100mL)	Maximum Percent Reduction (400/ 100mL)
Lower Iroquois	Gay Creek	FLIDB-01	8/19/2008 - 9/17/2008	5	700	3,600	71%	89%
	Fountain Creek	FLIDA-01	8/19/2008 - 9/17/2008	5	129	222	0%	0%
	Mud Creek East	FLIC-04	8/19/2008 - 9/17/2008	5	377	3,600	47%	89%
	Mud Creek West	FLID-02	8/19/2008 - 9/17/2008	5	502	2,100	60%	81%
	Pigeon Creek	FLIDD-CP-C3	10/3/2000 - 9/17/2008	6	514	2,500	61%	84%
	Prairie Creek	FLG-01	8/19/2008 - 9/17/2008	5	645	4,200	69%	90%
	Spring Creek	FLH-02	8/19/2008 - 9/17/2008	5	411	840	51%	52%
	Sugar Creek	FLI-M-D	8/19/2008 - 9/17/2008	8	376	1,100	47%	64%
	Sugar Creek	FLI-01	8/19/2008 - 9/17/2008	5	514	860	61%	53%
	Sugar Creek at Milford	05525500	1/19/1978 - 1/25/1996	121	1,354	84,000	85%	100%
	Sugar Creek at Milford	FLI-02	3/8/1999 - 6/10/2008	46	227	7,455	12%	95%
	Unnamed Trib Mud Creek West	FLIDE-01	8/19/2008 - 9/17/2008	5	912	2,780	78%	86%
	Unnamed Trib Sugar Creek	FLIE-01	8/19/2008 - 9/17/2008	5	328	788	39%	49%
	Whisky Creek	FLIDAA-01	8/19/2008 - 9/17/2008	5	309	3,900	35%	90%
	Beaver Creek	FLD-03	8/19/2008 - 9/17/2008	5	388	1,380	48%	71%
	Iroquois River	FL-07	8/19/2008 - 9/17/2008	5	759	3,200	74%	88%
	Iroquois River	FL-03	8/19/2008 - 9/17/2008	5	780	3,500	74%	89%
	Iroquois River at Iroquois	05525000	1/25/1978 - 1/25/1996	123	333	8,000	40%	95%
	Iroquois River at Iroquois	FL-04	3/31/1999 - 6/10/2008	40	171	7,636	0%	95%
Lower Kankakee	Iroquois River near Chebanse	05526000	1/25/1978 - 11/25/1996	165	137	70,000	0%	99%
	Iroquois River near Chebanse	FL-02	3/8/1999 - 6/18/2008	42	84	2,500	0%	84%
	Kankakee River at Momence	05520500	12/16/1977 - 11/25/1996	170	170	39,000	0%	99%
	Kankakee River at Momence	F-02	3/8/1999 - 10/17/2006	30	91	700	0%	43%
	Kankakee River near Wilmington	F-16*	1/14/2003 - 6/18/2008	16	61	240	0%	0%

Table 7. Summary of Fecal Coliform Data within the Kankakee/Iroquois Watershed

Watershed Group	Site Name	Station	Period of Record	# Samples	Geomean (#/ 100 mL)	Maximum (#/ 100 mL)	Geomean Percent Reduction (200/ 100mL)	Maximum Percent Reduction (400/ 100mL)
Lower Kankakee	Kankakee River near Wilmington	05527500	4/30/1980 - 10/21/1996	128	126	20,000	0%	98%
	Kankakee River near Wilmington	F-01	3/30/1999 - 9/19/2002	21	110	8,900	0%	96%
Middle Kankakee	Kankakee River at Shelby (SR 55)	KR-68	1/6/1976 - 3/31/1988	118	136	35,000	0%	99%
Upper Kankakee	Kankakee River near Union Center	KR-118	2/21/1978 - 3/29/1988	109	458	56,000	56%	99%

* Segment F-01 impairment status previously based on data collected at station F-01; impairment status now based on data from station F-16.